

What Is Claimed Is:

- 1 *Sub 2* 1. A composition comprising a population of oligodeoxynucleotide-
2 containing lipid vesicles in an aqueous carrier, at least a portion of the lipid vesicles within said
3 population being small multilamellar vesicles,
4 wherein the small multilamellar vesicles comprise:
5 (a) a lipid component comprising 20-30 mol % of an ionizable amino lipid, a
6 steric barrier lipid and additional lipid components selected from among neutral lipids and
7 sterols; and
8 (b) ODNs contained in the lumen or interlamellar spaces of the small
multilamellar vesicles.

2. The composition according to claim 1, wherein the oligodeoxynucleotide
and the lipid component are present in a weight/weight ratio of from 0.025 to 0.25.

3. The composition according to claim 1, wherein the oligodeoxynucleotide
and the lipid component are present in a weight/weight ratio of from 0.15 to 0.25.

4. The composition according to claim 1, wherein the oligodeoxynucleotide
and the lipid component are present in a weight/weight ratio of from 0.015 to 0.20.

5. The composition according to claim 1, wherein the ionizable amino lipid
is DODAP.

6. The composition according to claim 2, wherein the steric barrier lipid is
PEG-CerC₁₄.

1 7. The composition according to claim 6, wherein the lipid component
2 comprises a sterol, and the sterol is cholesterol.

1 8. The composition according to claim 6, wherein the lipid component
2 comprises a neutral lipid selected from among DOPE, DSPC, POPC and, SM.

1 9. The composition according to claim 1, wherein the lipid component
2 comprises DSPC, CHOL, DODAP and PEG-CerC₁₄ in a molar ratio of 25:45:20:10.

1 10. A method for preparing oligodeoxynucleotide encapsulated in the lumen
2 and interlamellar spaces of small multilamellar lipid vesicles comprising the steps of:

3 (a) preparing a lipid mixture comprising 20-30 mol % of an ionizable amino
4 lipid, a steric barrier lipid and additional lipid components selected from among neutral lipids
5 and sterols in an ethanolic solvent;

6 (b) preparing a solution of oligodeoxynucleotide in an aqueous solvent having
7 a pH at which the ionizable amino lipid is positively charged;

8 (c) adding the lipid mixture to the solution of oligodeoxynucleotide to form a
9 mixture containing lipid vesicles;

10 (d) passing the mixture containing lipid vesicles through a filter to produce
11 sized lipid vesicles in a solution containing ethanol;

12 (e) removing the ethanol from the sized lipid vesicles; and

13 (f) increasing the pH of the solution surrounding the sized lipid vesicles to
14 reduce the net positive charge on the exterior of the sized lipid vesicles, wherein at least a portion
15 of the sized lipid vesicles are small multilamellar vesicles.

1 11. The method of claim 10, wherein the ethanolic solvent is 100% ethanol.

1 12. The method of claim 11, wherein the solution of oligodeoxynucleotide is
2 in an aqueous citrate buffer.

1 13. The method of claim 10, wherein the filter has a pore size of 100 nm.

1 14. The method of claim 10, wherein the ethanol is removed by dialysis.

1 15. The method of claim 10, wherein the pH is changed by dialyzing the sized
2 lipid vesicles against a replacement buffer.

16. The method of claim 10, wherein the solution containing ethanol and the
sized lipid vesicles has an ethanol concentration of 20 to 40%.

17. The method of claim 10, wherein the solution containing ethanol and the
sized lipid vesicles has an ethanol concentration of 30 to 40%.

18. The method according to claim 10, wherein the ionizable amino lipid is
DODAP.

1 19. The method according to claim 18, wherein the steric barrier lipid is PEG-
2 CerC₁₄.

1 20. The method according to claim 19, wherein the lipid component comprises
2 a sterol, and the sterol is cholesterol.

1 21. The method according to claim 20, wherein the lipid component comprises
2 a neutral lipid selected from among DOPE, DSPC, POPC and, SM.

- 1 22. The method according to claim 10, wherein the lipid component comprises
2 DSPC, CHOL, DODAP and PEG-CerC₁₄ in a molar ratio of 25:45:20:10.

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